CLAIMS

What is claimed is:

1. A flow cell comprising:

a substrate having at least one sample channel and at least one optical fiber channel holder;

at least one optical fiber disposed within each optical fiber channel holder, wherein each optical fiber has at least one grating;

wherein each optical fiber grating is in contact with each sample channel, defining a sensing area; and

at least one sample port positioned in an operable relationship to at least one sample channel.

2. A flow cell according to claim 1, wherein the sample channel is curved to provide optimal fluid flow within the sensor area.

3. A flow cell according to claim 1, wherein the substrate has a monolithic structure.

4. A flow cell according to claim 3, wherein the monolithic structure is either a cylinder or a planar structure.

5. A flow cell according to claim 1, wherein the substrate comprises at least two mating pieces.

6. A flow cell according to claim 5, wherein a plurality of mating pieces form a kit having interchangeable parts whereby the configuration of the flow cell is modified.

7. A flow cell according to claim 5, wherein the mating pieces form either a cylinder or a planar structure.

8. A flow cell according to claim 1, further comprising at least one sample outlet positioned in an operable relationship to at least one sample channel.

9. A flow cell according to claim 8, wherein the substrate has a monolithic structure.

10. A flow cell according to claim 9, wherein the monolithic structure is either a cylinder or a planar structure.

11. A flow cell according to claim 8, wherein the substrate comprises at least two mating pieces.

12. A flow cell according to claim 11, wherein a plurality of mating pieces form a kit having interchangeable parts whereby the configuration of the flow cell is modified.

13. A flow cell according to claim 11, wherein the mating pieces form either a cylinder or a planar structure.

14. A flow cell according to claim 1, wherein the flow cell comprises one sample port and a plurality of sample channels.

15. A flow cell according to claim 1, wherein the flow cell comprises a plurality of sample ports and one sample channel.

16. A flow cell according to claim 8, wherein the flow cell comprises one sample port, a plurality of sample channels, and one sample outlet.

17. A flow cell according to claim 8, wherein the flow cell comprises one sample port, a plurality of sample channels, and a plurality of sample outlets.

18. A flow cell according to claim 8, wherein the flow cell comprises a plurality of sample ports, one sample channel, and one sample outlet.

19. A flow cell according to claim 8, wherein the flow cell comprises a plurality of sample ports, one sample channel, and a plurality of sample outlets.

20. A flow cell according to claim 8, wherein the flow cell has 2 sample channel ports.

21. A flow cell according to claim 8, wherein the flow cell has 8 sample channel ports.

22. A flow cell according to claim 8, wherein the flow cell has 96 sample channel ports.

23. A flow cell according to claim 8, wherein the flow cell has 384 sample channel ports.

24. A flow cell according to claim 8, wherein the flow cell has 1536 sample channel ports.

25. A flow cell according to claim 8, wherein each sample channel is spaced apart a distance of less than or about 9mm.

26. A flow cell according to claim 8, wherein the flow cell is microtiter plate compatible.

27. A flow cell according to claim 1, wherein each sample port has a means to control delivery of the sample into each sample channel.

28. A flow cell according to claim 27, wherein the means to control delivery of the sample into each sample channel is by aspiration.

29. A flow cell according to claim 27, wherein the means to control delivery of the sample into each sample channel is by a continuous flow.

30. A flow cell according to claim 27, wherein the means to control delivery of the sample into each sample channel is by a continuous flow with dwell time.

31. A flow cell according to claim 8, wherein each sample port has a means to control delivery of the sample into each sample channel.

32. A flow cell according to claim 31, wherein the means to control delivery of the sample into each sample channel is by aspiration.

33. A flow cell according to claim 31, wherein the means to control delivery of the sample into each sample channel is by a continuous loop.

34. A flow cell according to claim 31, wherein the means to control delivery of the sample into each sample channel is by a continuous flow.

35. A flow cell according to claim 31, wherein the means to control delivery of the sample into each sample channel is by a continuous flow with dwell time.

36. A flow cell according to claim 8, wherein the sample is selected from the group consisting of: a liquid sample; a gas sample; and a complex sample.

37. A flow cell according to claim 1, wherein the grating is a long period grating.

38. A flow cell according to claim 37, wherein a reacting coating is positioned in an operable relationship to the long period grating.

39. A flow cell according to claim 1, wherein the grating is a Bragg grating.

40. A flow cell according to claim 8, wherein the grating is a long period grating.

41. A flow cell according to claim 40, wherein a reactive coating is positioned in an operable relationship to the long period grating.

42. A flow cell according to claim 8, wherein the grating is a Bragg grating.

43. A process for conducting measurement studies on a sample and a flow cell, the process comprising the steps of:

a) providing a flow cell comprising a substrate having at least one sample channel and at least on optical fiber channel holder; at least one optical fiber disposed within each optical fiber channel holder, wherein each optical fiber has at least one grating wherein each grating is in contact with each sample channel, defining a sensing area; and at least one sample port positioned in an operable relationship to at least one sample channel;

b) introducing at least one sample into the flow cell through at least one sample inlet;

c) allowing each sample to flow into each sample channel;

d) measuring characteristics of the sample and the flow cell at the sensing area; and

e) removing the sample from each sample channel.

44. A process according to claim 43, wherein the flow cell further comprises at least one sample outlet positioned in an operable relationship to at least one sample channel.

45. A process according to claim 43, further comprising the step of introducing at least two different samples into the flow cell through at least one sample port and allowing the samples to mix in one sample channel.

46. A process according to claim 43, wherein the physical characteristics of the sample are selected from the group consisting of: temperature; pressure; refractive index; and pH.

47. A process according to claim 44, wherein the physical characteristics of the sample are selected from the group consisting of: temperature; pressure; refractive index; and pH.

48. A process according to claim 43, wherein the sample is selected from the group consisting of: a liquid sample; a gas sample; and a complex sample.

49. A process according to claim 44, wherein the sample is selected from the group consisting of: a liquid sample; a gas sample; and a complex sample.

50. A process according to claim 43, wherein the characteristics of the sample are biochemical characteristics.

51. A flow cell kit comprising an upper substrate having at least one sample channel and at least one sample port disposed therein; at least one optical fiber channel holder having at least one optical fiber having a grating disposed therein; wherein the optical fiber channel holder has a means to connect to the upper substrate; and a lower substrate having a means to connect to the optical fiber channel holder on a side opposite from the upper substrate.

52. A flow cell kit according to claim 51, wherein the upper and lower substrates each have a means to interconnect with each other.